

Epidemiology of Hospitalizations for Sepsis in Rhode Island, 1990 – 2002

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Sepsis (overwhelming infection of the bloodstream) is a frequent cause for hospitalization in Rhode Island and the United States, and it has been increasing in incidence over several decades.^{1,2,3} Once hospitalized, sepsis patients have relatively high in-hospital mortality rates. In response to legislation passed in the 2003 session of the Rhode Island General Assembly [2003-H5845aa “The Sepsis Information Act”], the Rhode Island Department of Health has analyzed data on the demographic characteristics and the medical parameters of patients with a diagnosis of sepsis who were treated in Rhode Island’s acute care hospitals during the period 1990-2002.⁴ This report presents selected information from the full analysis.

Methods. Acute-care general hospitals in Rhode Island have been reporting patient-level data for every inpatient discharged since October 1, 1989, as required by licensure regulations. The data reported includes demographics and clinical data coded to the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM).⁵

The analysis was modeled after a recent national study.¹ Included cases were any discharge from an acute-care general hospital with a diagnosis of sepsis in any of the reported diagnosis fields. The diagnosis of sepsis included: septicemic plague (ICD-9-CM code 020.2), septicemia (038), disseminated candida infection (112.5), disseminated fungal endocarditis (112.81), disseminated fungal infection (117.9), and bacteremia (790.7). Definitions of the specific causative organisms were also based on ICD-9-CM diagnosis and procedure codes, as specified in the reference national study.¹

Rates per 100,000 population for Rhode Island were age-adjusted to the 2000 standard United States population for comparison over time.⁶ Population denominators for Rhode Island by age group were internal estimates produced by the Rhode Island Department of Health based on the 1990 and 2000 Census data for the state. The age groups used for standardization were as follows: less than 1 year, 1-4 years, 5-14 years, 15-24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years, 65-74 years, 75-84 years, 85 years and older.

Results. During the period from 1990-2002, there were 36,593 inpatient discharges from Rhode Island hospitals with a principal or additional diagnosis of sepsis. The annual average number was 2,815, the minimum 1,998 (in 1990), and

the maximum 3,430 (in 2002). The 36,593 discharges with a sepsis diagnosis represented 2.13% of the total number of hospital discharges during this period (1,721,262), a percentage that varied from a low of 1.42% in 1990 to a high of 2.57% in 2002.

For the entire period, the rate of discharge for sepsis, age-adjusted to the 2000 United States standard population, was 251.2 per 100,000 population in Rhode Island. Annual rates varied from 187.7 per 100,000 in 1990 to 287.7 per 100,000 in 2002. (Figure 1) The overall increase in the rate (53.3%) is equivalent to an annual compounded increase of 3.6%.

Most sepsis discharges were age 65 or older (65.0%). The discharge rate for sepsis increased consistently with age from children ages 5 – 14 years, whose rate of 18.3 per 100,000 was the lowest, to the very elderly ages 85 and older, whose rate of 2,406.8 per 100,000 was the highest. (Figure 2) Infants under the age of one year also had relatively high rates of hospitalization for sepsis, 694.5 per 100,000.

Sepsis may result from infections caused by a variety of organisms. Over the 13-year period for which Rhode Island

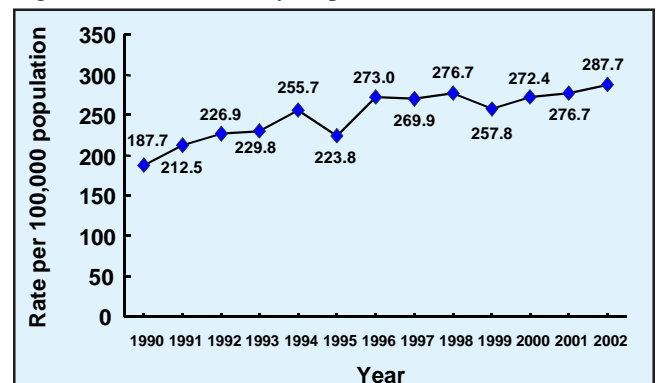


Figure 1. Hospital Discharges with Diagnosis of Sepsis per 100,000 Population, by Year of Discharge, Rhode Island, 1990-2002.

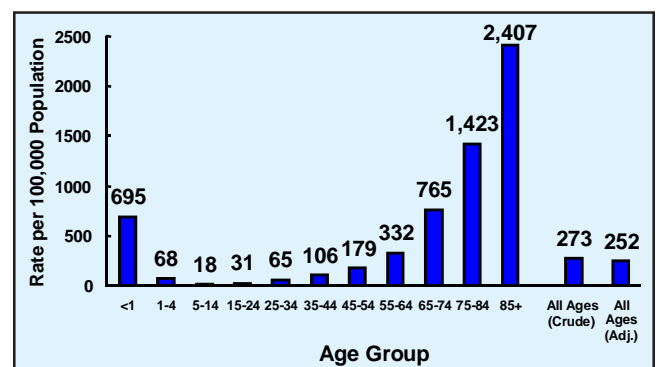


Figure 2. Hospital Discharges with Diagnosis of Sepsis per 100,000 Population (Average Annual Rate), by Age Group, Rhode Island, 1990-2002.

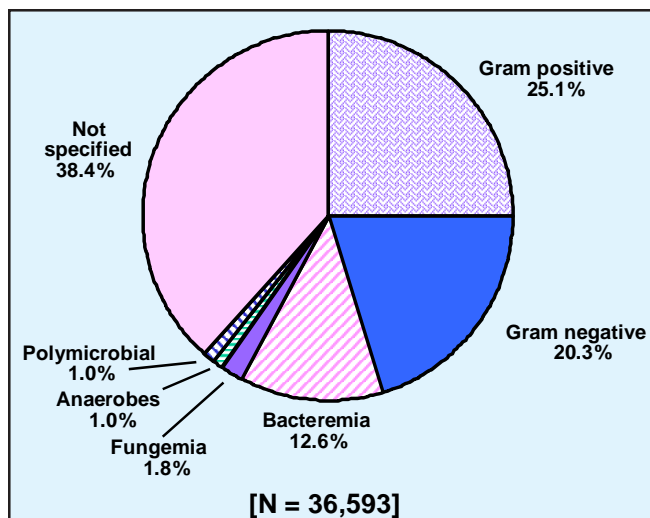


Figure 3. Hospital Discharges with Diagnosis of Sepsis, by Causative Organism, Rhode Island, 1990-2002.

cases have been examined, the most common source of infection has been gram-positive organisms (25.1%), followed by gram-negative organisms (20.3%), and generalized bacteremia (12.6%). Smaller numbers were infected by fungi (1.8%), anaerobes (1.0%) and multiple organisms (1.0%). A large proportion (38.4%) of discharges with sepsis were not characterized as to the infecting organism. (Figure 3)

Patients hospitalized with a diagnosis of sepsis are often elderly persons with significant coexisting conditions and therefore at relatively high risk of dying. During 1990-2002, 7,758 (21.2%) of 36,593 sepsis patients were discharged dead from the hospital. The in-hospital mortality rate varied over the period, with the highest rate (25.5%) occurring in 1990, followed by a period of general decline to the lowest rate (17.6%) in 1998. Subsequently, the rate rose to 23.4% in 2002, comparable to the rates seen in the early 1990's. (Figure 4)

Discussion. Sepsis is a leading cause of death and a growing cause of hospitalization in Rhode Island. It is most common among the elderly, especially those with other conditions that make them susceptible to infection and at greater risk of dying, but also occurs with elevated frequency among infants and young children. The analysis of data on hospitalizations with sepsis illuminates the epidemiology of

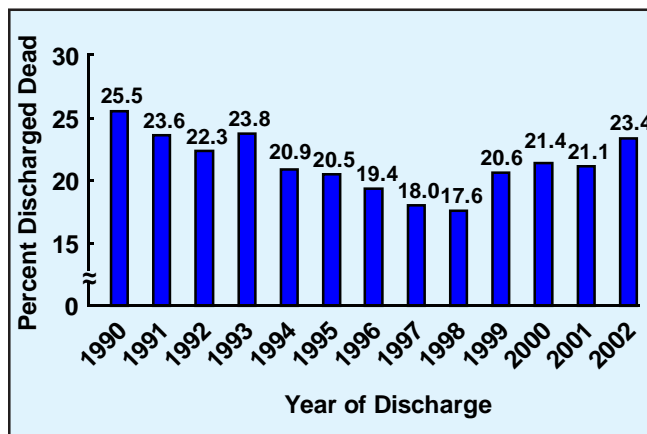


Figure 4. In-Hospital Mortality Rate for Hospital Discharges with Diagnosis of Sepsis, by Year of Discharge, Rhode Island, 1990-2002.

this condition and will support the identification and implementation of preventive measures based on public health principles.

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References

- 1 Martin GS, Mannino DM, Eaton S, et al. The epidemiology of sepsis in the United States from 1979 through 2000. *NEJM* 2003;348:1546-54.
- 2 Kochanek KD, Smith BL. Deaths: Preliminary Data for 2002. *National vital statistics reports*; vol. 52, no. 13. Hyattsville MD: National Center for Health Statistics. 2004.
- 3 Division of Vital Records. *Vital Statistics Annual Report 1999*. Providence RI: Rhode Island Department of Health. 2004.
- 4 Buechner JS, Williams KA. *Epidemiology of Hospitalizations for Sepsis in Rhode Island, 1990 – 2002*. Providence, RI: Rhode Island Department of Health, Office of Health Statistics. 2004.
- 5 Public Health Service and Health Care Financing Administration. *International Classification of Diseases, 9th Revision, Clinical Modification, 6th ed*. Washington: Public Health Service, 1996.
- 6 Anderson RN, Rosenberg HM. Age Standardization of Death Rates: Implementation of the Year 2000 Standard. *National vital statistics reports*; vol. 47, no. 3. Hyattsville MD: National Center for Health Statistics. 1998.

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